

REMARKS

Applicant amended claims 96 and 104, and canceled claim 105. Claims 1-95 were previously canceled. Claims 96-104 and 106-145 remain pending in this application.

Telephone Interview

Applicant appreciates the courtesy of a further telephonic interview with the Examiner on July 19, 2005. At the interview, the prior art cited and applied in the present Office Action were discussed in relation to exemplary claims 96 and 104. In particular, Applicant proposed to amend claim 96 to positively recite in the preamble the support of an optical fiber in the optical coupling, as opposed to the intended use for such. Applicant also proposed to amend claim 104 to specifically state that the first ferrule half and second ferrule half are separate pieces. The Examiner preliminarily indicated that such amendment would distinguish over the crimp-type sleeve structure in the Karlovich patent, and that the Karlovich patent does not teach a ferrule comprising a separate first ferrule half and a second ferrule half. Applicant also presented arguments in support of why it would not have been obvious to combine the Ochiai patent and the Lessar patent to render the stamped metal ferrule body structure recited in claim 96 unpatentable. Such arguments are repeated and further elaborated below.

The Invention

In examining the present application, the Examiner should keep in mind the context in which the claimed optical coupling of the present invention is structured for use in optoelectronic applications. By way of background, for optoelectronic applications, components such as

connectors for aligning optic fibers (e.g., on the order of 0.125mm in diameter) require a high manufacturing tolerance, such as within 1000nm to be useful. Some of the optoelectronic components are made out of molded plastic or polymer material, with less than desirable tolerance. In the past, in an attempt to offset for the large manufacturing tolerances, many optoelectronic components are designed with relatively complex structures (e.g., alignment means, biasing means, etc.) that require higher manufacturing costs and relatively complicated assembly procedures for a user in the field. Alternatively, the prior art optoelectronic components are manufactured using precision systems and processes that are relatively complex and costly to achieve the desired manufacturing tolerances. For example, components were made by reactive ion-etching silicon wafers.

Until the creation of the present invention, none of the prior art optoelectronic components has been successfully manufactured by means of stamping processes to achieve the desired tolerances, and which can be easily deployed in the field by a user. The failure of the prior art to achieve such tolerance is due to not only the absence of a viable high tolerance stamping system and process, but also the failure of viable component structures that can be manufactured by stamping systems and processes, and that can be easily deployed by a user in the field.

The present invention is directed to optoelectronic components (e.g., assemblies and sub-assemblies), in particular an optical coupling having structures that lend themselves to be manufactured by high-speed stamping systems and processes, such as the novel stamping system and process disclosed in Applicant's co-pending U.S. patent application no. 10/620,851, which is capable of stamping optoelectronic components having tolerances of 1,000 nm or less, required by many optoelectronic applications. The inventive optoelectronic components include optical

fiber connectors, including precision ferrules in association with alignment sleeves. Either or both ferrules and sleeves may be stamped from metal.

The results achieved by the invention are new, unexpected, superior, critical, and unsuggested by any prior art.

Obviousness Rejection Based on Ochiai and Lessar

The Examiner acknowledged that Ochiai does not teach ferrules formed by a stamping process. That is not its only deficiency. Ochiai also does not teach ferrule halves received by a sleeve.

By way of background, Ochiai teaches an optical module connection system for connecting an optical fiber to an optical link module that performs conversion between an electrical signal and an optical signal. Ochiai discloses essentially two embodiments of optical link modules, as illustrated schematically by Fig. 1 and Fig. 2. The Fig. 1 embodiment relies on a coupling means 5 (e.g., a cylindrical coupler as shown) to couple two ferrules, but the Fig. 2 embodiment relies on a different positioning means 10 (e.g., guide pins) to align the position the coupling means 11 against the optoelectronic conversion means. Various specific structures were disclosed for each of these two embodiments. (Applicant submits that the various overall structures associated with these two embodiments should be treated separately and independently, because the coupling associated with each embodiment is of a different nature, and each embodiment is complete by itself. It would not be reasonable to conveniently and selectively pick and choose specific structures from the different embodiments in a mix and match fashion, to obtain corresponding structures of the present invention. Such would be using impermissible hindsight reconstruction.)

Given the foregoing, a reasonable reading of Ochiai leads to the conclusion that it does not disclose a metal ferrule that comprises two ferrule halves. The Examiner refers to Figs. 21 and 23 and accompanying disclosure starting at col. 9, line 18, to show the disclosure of metal ferrule halves. Fig. 21 and 23 refers to the embodiment schematically illustrated in Fig. 2. The illustrated optical link module 40 consists of two silicon substrates 45 and 46 made of silicon. The substrates 45 and 46 do not correspond to a ferrule or ferrule halves, and further a ferrule that is slidably received in a sleeve. Instead, a terminal 42 (also made of silicon) at the end of an optical fiber 43 is butted against the optical link module 40 in the housing 41, using guide pins 44a and 44b. These components are secured in place using a metal plate spring 53 to latch onto the terminal 42. Further, there is teaching in Ochiai to replace the silicon substrates 45 and 46 with metal substrates. In fact, Ochiai expressly and by implication teach away such metal substrates because the substrates 45 and 46 are supposed to support metal connectors 49a-c, as shown in Fig. 21.

Lessar does not make up for the deficiencies of Ochiai. Lessar does not disclose ferrules that support optical fibers, which are formed by a stamping process, and further ferrules halves formed by stamping. Instead, Lessar tangentially referred to stamping of a flat circular ferrule 20 to hold a lens 30. It does not appear that the lens holding ferrule is intended to be manufactured to have the kind of tolerance required for optical fiber couplings as in the present invention, regardless of the specific manufacturing process. This point is particularly clear based on the fact the ferrule 20 is designed with a stress relief structure, and in particular a U-shaped strain relief channel 22 along the perimeter of the ferrule body. With such U-shaped channel structure, the ferrule 20 can "give" to some extent to reduce residual stress against the surrounding structure. This is the specific intent of the invention disclosed in Lessar. However, for optical

coupling of optical fibers, such strain relief in the supporting ferrule would create unacceptable tolerances, resulting in misalignment of the fibers. Such concerns would outweigh any economical advantage associated with stamping process manufacturing in general. It is therefore abundantly clear that Lessar does not teach using stamping process to form extremely high tolerance optical couplings for optical fibers.

A person skilled in the art would not have specifically look to Lessar for guidance in the manufacturing of optical coupling for fibers. And even if one were to refer to Lessar in hope of such guidance, Lessar simply does not contain an enabling disclosure of forming a stamping process optical fiber supporting ferrules in an optical coupling.

Given the foregoing, even if Ochiai and Lessar can somehow be combined, such combination would not result in an enabling disclosure of an optical coupling comprising ferrules formed by a stamping process, as required by the independent claims in the present application. Even if the references can somehow be combined, it would be necessary to make modifications, not taught in the prior art, in order to combine the documents to obtain the claimed invention.

Further, Applicant respectfully submits that Ochiai and Lessar should not have been combined in the first place to render the claimed invention obvious, since such combination would not have been obvious to a person skilled in the art. Ochiai is directed to an optical link module for the specific purpose of terminating a fiber link and converting optical and electrical signals. Lessar on the other hand is directed to the structure of an optical window for implantable medical devices. It is clear that neither Ochiai nor Lessar contain any suggestion (express or implied) that they be combined, or that they be combined in any specific manner to obtain the claimed invention. Each reference is complete and functional in itself for the specific

purpose disclosed in the respective reference, so there would be no reason to use teachings from, or add or substitute teachings to any other document. Neither Ochiai nor Lessar includes any hint or suggestion to refer to the other reference for guidance on modifications. There is therefore no teaching or suggestion (expressed or implied), taking into account only knowledge which was with the level of ordinary skill at the time the invention was made, if and how Ochiai could be modified with Lessar, while maintaining the type of ferrule that Ochiai proposes for its optical link module connection system. Such modification is only possible with impermissible hindsight reconstructions, made possible only by the disclosure of the present invention.

Further, Ochiai and Lessar take mutually exclusive paths and reach different solutions to different problems that the respective references address. Ochiai requires alignment of optical fibers to an optical link module, using coupling or guide pins to position two components with tight tolerance. Lessar on the other hand requires strain relief to reduce residual stress in the lens mount, which effectively results in a structure with a relatively lower tolerance. Consequently, they effectively teach away from each other (expressly or by implication). Therefore it would not be logical to combine them.

Still further, because Lessar is from a very different technical field than that of the present invention, and that of Ochiai, Lessar would be deemed to be "non-analogous art".

In examining the present application, the Examiner should keep in mind the context of high tolerance parts required for aligning optical fibers, as achieved by the present invention. The present invention provides an enabling solution to a long felt need, achieving advantages beyond what the prior art has to offer. The accomplishments of the inventors of the present invention involve no small steps. (However, even if the steps taken by the inventors is deemed to be small, the invention is classified in a crowded art; therefore even if a "small" step forward

should be regarded as significant.) If the present invention were in fact obvious, because of its advantages, those skilled in the art surely would have implemented it by now. That is, the fact that those skilled in the art have not implemented the invention, despite its great advantages, indicates that the combination suggested in the Office Action would not have been obvious.

Applicant respectfully requests the Examiner to reference specific sections in the cited documents to support any conclusion that the present invention as defined by all the independent claims are not obvious over Ochiai and Lessar.

Anticipation by Karlovich

Claims 96-98, 103-111, 115 and 130-134 have been rejected as being anticipated by Karlovich. This rejection has been traversed.

In the Office Action, the Examiner commented that the language "for supporting an optical fiber" recites intended use. Applicant amended independent claim 96 to remove the term "for" in the preamble, thus making the support of optical fiber part of the limitation recited in the preamble. Karlovich is not related to the support of optical fiber.

Accordingly, claim 96 should be patentable over Karlovich. The remaining dependent claims are likewise patentable.

The Examiner also commented that the language in claim 104 does not specify that the two ferrule halves are separate parts. Applicant amended the language to recite that the two ferrule halves are initially brought together and maintained in a mating relationship by a sleeve. This makes clear that the two ferrule halves have separate structures that initially come together in a cooperative fashion to hold the optical fiber (the two halves may be interconnected, as

recited in further dependent claims 115 and 116). This contrastd from the structure in Karlovich, which is instead directed to a ferrule having a preset tubular structure, in which there are no two parts, whether interconnected or not, that initially come together and maintained together by a sleeve.

Applicant respectfully submits that the present amendments do not raise new issues, and clearly place the claims to be allowable over Karlovich. The amendment to claim 96 merely recite the limitation also found in the other independent claims, which claims had been found to be allowable over Karlovich (i.e., no rejection of the other independent claims based on Karlovich). The amendment to dependent claim 104 essentially includes the limitation of claim 105 (which has been deleted herein). Besides, given the patentability of independent claim 96, claim 104 should be patentable in any event.

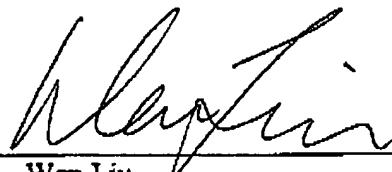
Obviousness Rejection based on Karlovich

The Examiner rejected claims 112 and 113 as being obvious over Karlovich. This rejection has been traversed in view of the traversal of independent claim 96 above.

CONCLUSION

In view of all the foregoing, Applicant submits that the claims pending in this application are patentable over the references of record and are in condition for allowance. Such action at an early date is earnestly solicited. **The Examiner is invited to call the undersigned representative to discuss any outstanding issues that may not have been adequately addressed in this response.**

Respectfully submitted,



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